



King's Research Portal

Document Version

Publisher's PDF, also known as Version of record

[Link to publication record in King's Research Portal](#)

Citation for published version (APA):

Kamenetzky, A., Hinrichs-Krapels, S., Wooding, S., & Grant, J. (2016). An analysis of the impact of research supported by the UK National Institute of Health Research. In *Impacts of agricultural research - an approach of societal values: An International Conference organized by the French National Institute for Agricultural Research (INRA) The Policy Institute at King's*.

Citing this paper

Please note that where the full-text provided on King's Research Portal is the Author Accepted Manuscript or Post-Print version this may differ from the final Published version. If citing, it is advised that you check and use the publisher's definitive version for pagination, volume/issue, and date of publication details. And where the final published version is provided on the Research Portal, if citing you are again advised to check the publisher's website for any subsequent corrections.

General rights

Copyright and moral rights for the publications made accessible in the Research Portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognize and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the Research Portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the Research Portal

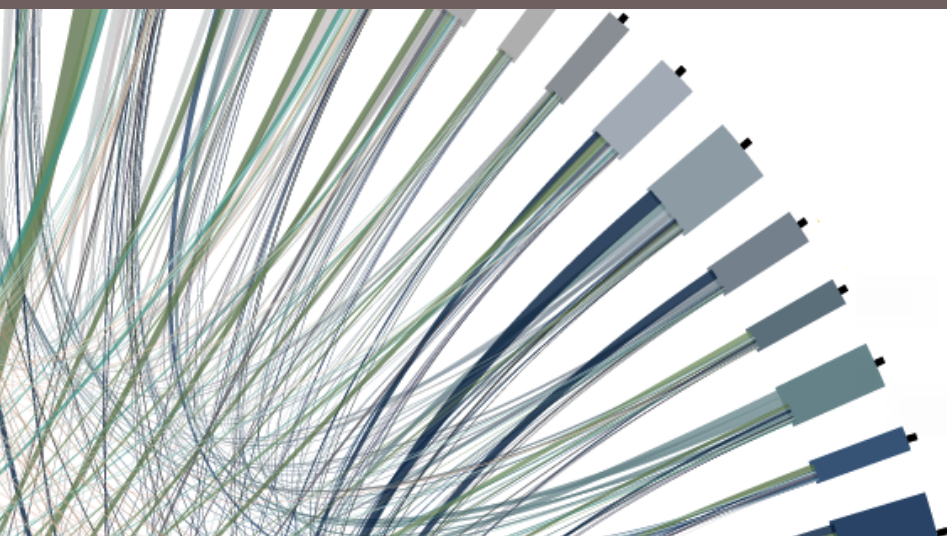
Take down policy

If you believe that this document breaches copyright please contact librarypure@kcl.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.

An analysis of the impact of research supported by the UK National Institute of Health Research

Conference proceeding submitted as part of an oral presentation at 'Impacts of agricultural research - an approach of societal values' - an International Conference organized by the French National Institute for Agricultural Research (INRA).

Adam Kamenetzky, Saba Hinrichs-Krapels,
Steven Wooding and Jonathan Grant



March 2016

About the Policy Institute at King's

The Policy Institute at King's College London acts as a hub, linking insightful research with rapid, relevant policy analysis to stimulate debate, inform and shape policy agendas. Building on King's central London location at the heart of the global policy conversation, the Policy Institute's vision is to enable the translation of academic research into policy and practice by facilitating engagement between academic, business and policy communities around current and future policy needs, both in the UK and globally. The Policy Institute combines the academic excellence of King's with the connectedness of a think tank and the professionalism of a consultancy.

About the Policy Research in Science and Medicine (PRiSM) Unit

The Policy Research in Science and Medicine (PRiSM) unit brings together research expertise from RAND Europe and the Policy Institute at King's College London.

The PRiSM unit delivers research-based evidence to the UK's National Institute for Health Research (NIHR) to support the NIHR's research strategy, Best Research for Best Health, and contributes to the science of science policy field in the UK, Europe and internationally.

This is an independent report by the PRiSM unit, commissioned and funded by the Policy Research Programme in the Department of Health. The views expressed are not necessarily those of the Department of Health.

About RAND Europe

RAND Europe is a not-for-profit organisation whose mission is to help improve policy and decisionmaking through research and analysis. RAND Europe's clients include European institutions, governments, charities, foundations, universities and private sector firms with a need for impartial research. RAND Europe operates as a research-focused business, using a professional services model within the context of a public good mission. RAND Europe combines deep subject knowledge across diverse policy areas including health, science and innovation; defence, security and infrastructure; and home affairs and social policy. Combined with proven methodological expertise in evaluation, impact measurement and choice modelling, RAND Europe are able to offer quality-assured research and analysis, unbiased insights and actionable solutions that make a difference to people's lives. <http://www.randeurope.org>



Abstract

Recently, the majority of universities in the UK submitted data to the 2014 Research Excellence Framework (REF) exercise, including almost 7,000 evidence-informed narrative statements – ‘impact case studies’. This was the largest and most comprehensive peer-reviewed exercise in research impact assessment of its kind. Building on our previous high-level analysis of these impact case studies, we performed a ‘deep mine’ of a subset referencing support from the National Institute of Health Research (NIHR), the research arm of the UK’s National Health Service.

We aimed to describe the features of this research, reveal the pathways through which it delivered public health and social impacts, and curate a database summarising key narrative points.

We compiled a list of 57 distinct streams through which NIHR provides research support and/or funding, which we used to query the publicly available REF impact case study database. We identified 248 case studies directly referencing NIHR support, which we read in detail and coded according to an impact framework adapted for the purposes of this analysis.

Overall, case studies referenced 27 distinct NIHR support streams; most frequently the Health Technology Assessment stream [n=73; 29 per cent], concerned with evaluating the cost-effectiveness of new therapies prior to their adoption into the UK National Health Service. Collaborative support was frequent, with three quarters of NIHR supported case studies [n=185; 75 per cent] making reference to funding from another partner, principally charities and/or one or more of the UK Research Councils.

Almost all case studies [n=227; 92 per cent] provided evidence of research contributing to regional or national impacts, eg local implementation of health practices based on research findings. High proportions noted contributions to direct impacts on patients [n=101; 41 per cent] and a majority substantiated these claims by providing evidenced figures on the scale of public benefits, eg changes in patient outcomes observed as part of the research findings. Many provided evidence of research contributing to changes in international practice [n=112; 45 per cent], eg through widespread changes in healthcare procedures, service delivery or training. Few provided substantiated evidence of financial returns from the research [n=27; 11 per cent].

Using a freely available resource – the REF impact case studies – we derived and curated a rich database of quantitative, procedural and narrative data on research impact relevant to NIHR as a supporter of public health research.

From the benefits of singing clubs to improve health outcomes in the elderly, to newborn screening programmes for patients with blood disorders, to ensuring stroke care services reach those at the highest-risk in society, our analysis provides evidence of NIHR’s contribution to significant impacts. We plan to continue our work in this area with further policy relevant interrogations of the REF dataset.

Contents

Abstract.....	1
Background	3
Methods	6
Results	9
The nature of NIHR support.....	9
The scale of NIHR support	10
The impact of NIHR support	12
Discussion	15
Bibliography	18
Annexes	21

Background

In 2014, UK universities underwent the Research Excellence Framework (REF), the largest and most comprehensive peer-reviewed exercise in research impact assessment of its kind (Manville et al. 2015). The primary purpose of the REF was to determine the annual allocation of approximately £1.6 billion of public funding across the UK's higher educational sector from 2015-16 onwards.

In requiring submitting research institutions to demonstrate non-academic impacts, the 2014 REF differed from previous research assessment exercises, which in the UK have taken place approximately every five years since 1986 (King's College London and Digital Science 2015).

To help formulate its approach, the body responsible for organising the REF, the Higher Education Funding Council for England (HEFCE), commissioned an international review of how other organisations measure impact (Grant et al. 2010). Based on initial trials of the 'Research Quality Framework' in Australia, and following a successful pilot exercise, HEFCE settled on an approach whereby institutions self-selected and submitted narrative case study based examples of research with high impact, and provided evidence for this impact (Hinrichs and Grant 2015).

HEFCE recognised that because the setup of the REF would drive university's behaviours, it would be important to be very explicit about the criteria it used to assess impact. They defined impact as 'an effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life, beyond academia' (HEFCE 2012). Institutions were required to submit a four page impact case study, structured as follows:

1. Summary of the impact
2. A description of the underpinning research
3. References to the research
4. Details of the impact, and
5. Sources to corroborate the impact.

Over the course of late 2013 and 2014, peer reviewers – divided into 36 subject specific sub-panels – scrutinised a total of 6,975 impact case studies.¹ Alongside information on the quality of institutions' research outputs and vitality of their research environment, this fed into the overall REF process, which published its results on 18 December 2014.²

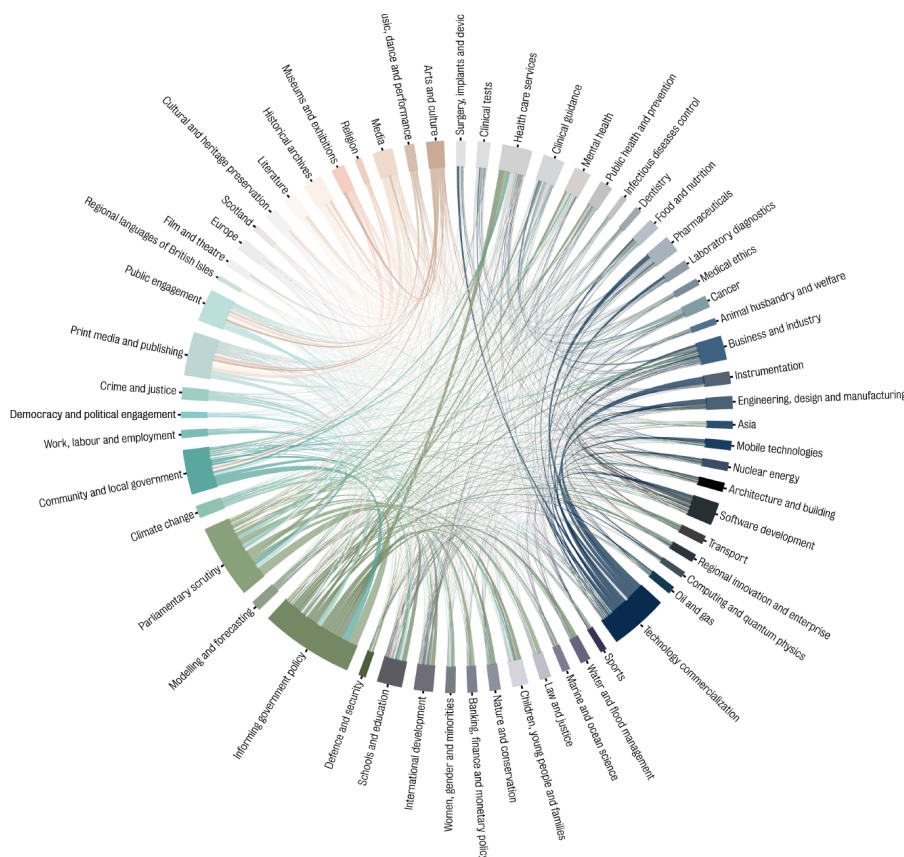
¹ See <http://www.ref.ac.uk> for further information [Accessed: 9 October 2015].

² See <http://results.ref.ac.uk> for results [Accessed: 9 October 2015].

HEFCE commissioned a number of evaluations of the REF submission and assessment processes themselves, with findings reported at various stages in the lifetime of the exercise.³ Two studies following the REF process are particularly relevant when considering mixed-methods approaches to impact assessment.

The first study, a high-level analysis of the nature, scale and beneficiaries of the impacts described in the REF case studies, provided a snapshot of their breadth and diversity. It revealed over 3,700 unique pathways by which research across a spectrum of academic fields has led to impacts in different societal sectors, and linked these to a series of 60 impact topics, derived from semi-automated text mining and topic modelling (King's College London and Digital Science 2015) (Figure 1). In addition the team developed and produced an online searchable database of the impact case studies.⁴

Figure 1: chord diagram representing the multiple and diverse linkages between 60 impact topics identified from the 6,679 non-redacted REF impact case studies, of which this cohort forms a subset (King's College London and Digital Science 2015)



Due to the inconsistency of quantitative evidence supporting claims for impact, this report suggested that the development of robust impact metrics was unlikely (King's College London and Digital Science 2015). However the authors encouraged further analysis of the rich data contained within those 6,679 case studies made publicly available (ie not including 296 case studies that had full or partial redactions).

³ See <http://www.rand.org/blog/2015/03/ref-2014-shows-that-research-impact-can-be-assessed.html> for further information [Accessed: 12 October 2015].

⁴ See <http://impact.ref.ac.uk/casestudies> for the searchable REF2014 impact case study database [Accessed: 9 October 2015].

The second study, an independent review of the role of metrics in research assessment and management, also cautioned against any like for like replacement of the REF peer review based system with quantitative indicators. It put forward a notion of ‘responsible metrics’ and noted a number of dimensions – such as humility, reflexivity and diversity – to consider when using quantitative measures in research governance, management and assessment (Wilsdon et al. 2015).

It is with these findings in mind that we developed a process to ‘deep dive’ into the REF impact case studies, using search terms that would reveal the contribution of research across different topic areas, to impacts of interest to different stakeholders.

Building on a study we undertook for the UK Collaborative on Development Sciences (UKCDS) (Hinrichs et al. 2015), we responded to a request from the director of research and development at the UK’s National Institute of Health Research (NIHR) to explore impacts arising from its support of medical research, as evidenced via REF2014.

As the research arm of the UK National Health Service, the NIHR supports over £1 billion of research each year. Established in 2006, NIHR invests in research infrastructure, systems, faculty and programmes with an overarching aim ‘to improve the health and wealth of the nation’.

Our aims in conducting an analysis of the REF case studies were threefold:

- identify if and how NIHR support was referred to in the case studies
- describe the features of those case studies referencing NIHR support
- provide a “curated” database of these case studies to aid future narrative development and advocacy.

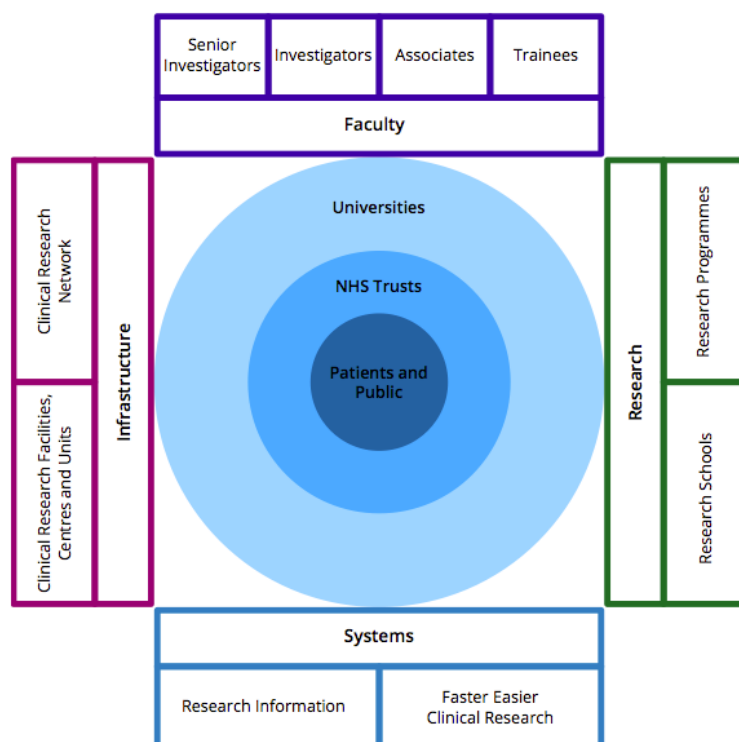
In using the REF impact case studies to gain insights into NIHR’s overarching impact, we were reliant on authors citing support for their research from NIHR, in a manner that would allow automated searches, with appropriate descriptions of the contribution of this research to societal gains. Our experience suggests that the data within the case studies – while it may not paint a complete picture – is sufficiently broad and empirically sound to provide an informative and indeed fascinating catalogue of impacts. In this sense we consider the REF case studies to be the best, if not the only, publicly available resource for this type of analysis.

Methods

We used as the basis for our analysis the REF impact case study database that our colleagues at Digital Science made available online at the point REF2014 published its results.⁴ This resource provides a queryable electronic interface that enables searching of the case studies using directed searches (ie searches of different sections of the case studies) as well as Boolean searches.⁵

Given a multiplicity of ways in which NIHR and its sub-funding streams may be referred to, our starting point was to compile a list of the names of NIHR's various routes for supporting research, along with their respective acronyms, as the basis for performing searches. Using information from the NIHR website, subsequently checked with NIHR's senior directorate, we compiled a list of 57 named support streams (including some initially set up prior to the NIHR's establishment in 2006) that might be considered as falling under the umbrella of 'NIHR support' [see Annex 1 for the full list of these support streams] (Figure 2).⁶

Figure 2: NIHR 'dartboard' showing its principal routes of support for research



⁵ See <http://impact.ref.ac.uk/CaseStudies/HowToSearch.aspx> for further information on how to search the REF case study database [Accessed: 9 October 2015].

⁶ See <http://www.nihr.ac.uk/about/structure.html> for information on the NIHR's setup and structure [Accessed: 9 October 2015].

We searched for references to NIHR support in sections 3 (references to the research) and 4 (details of the impact) of the case studies. We also ran searches for DH/NIHR grant reference numbers for awards made since 2004, to broaden the pool of potential case studies included for analysis.⁷

Using the REF case study search website's download function, we then collated a list of all case studies tagged from these searches in Excel (to include all content and metadata, such as submitting institution, subject area, and reference numbers), alongside PDFs of the case studies themselves.

Thus we identified a pool of 371 impact case studies as potentially of relevance to NIHR.

To inform our analysis, we first conducted a rapid read through of the case studies to identify features of potential interest to NIHR's senior management team. These included:

- the health area the research related to (as coded using HRCS health categories);⁸
- the specific disease/s the research related to;
- the types of interventions or investigations forming the focus of the research;
- short summaries of the human and/or societal impacts of the research, and;
- estimations of the scale of these impacts, where noted in the case studies.

[see Annex 2 for the full coding framework].

Where possible, we sought to capture and quantify the number of patients directly benefitting from the research described in the case studies. Though we were unable to perform a detailed review of all references, we aimed only to include in this sub-analysis case studies providing substantiating evidence of patient impacts (eg via published audit or research papers). To allow some degree of comparison we grouped patient impacts into three broad categories: less than 1,000 people; 1,000 to 1 million people, and; over 1 million people.

We also sought to capture in our analysis those case studies that provided evidence of financial returns arising from uptake of research findings, such as cost savings to the NHS or licensing revenue, in absolute terms. Similarly, to aid future comparison we grouped financial returns into three broad categories: less than £1,000; £1,000 to £1 million, and; over £1 million.

Lastly we attempted to provide a subjective assessment of the strength of narrative laid out in each case study, to act as a guide for future analysis and use of the case study data by NIHR for its own advocacy purposes. We grouped these assessments into three categories: weak narrative (consider excluding), in cases where impacts were unclear or poorly described; neither strong nor weak, where we felt that a case could be made either way, and; strong narrative (consider developing further), where we felt there was significant potential for public interest in the research. One author (AK) then read in detail all of the case studies identified from the initial search of the REF

⁷ As supplied by David Kryl, NIHR Business Intelligence Unit, pers comm. 8 April 2015.

⁸ We assigned a single HRCS health category to each case study based on the principal focus of the research, or (if ambiguous) the category corresponding to the main impact described. See <http://www.hrcsonline.net/hc> for further information on HRCS health categories [Accessed: 9 October 2015].

database, coded each, and collated results against the original case study data submitted to REF in Excel [available on request as Annex 3].

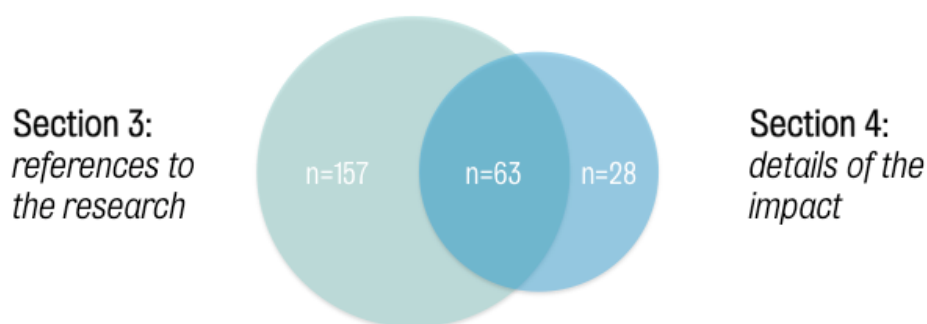
By assessing the context in which NIHR support streams were mentioned, and cross-checking research grant titles with data on NIHR's website, we excluded studies making no reference to research receiving direct support from NIHR or associated streams. We also excluded a number of false positives arising from hits on acronyms shared with other organisations (eg 'HTA' standing for 'Human Tissue Authority' vs 'Health Technology Assessment'), which were not relevant to NIHR support. A total of 123 case studies were thus excluded.

Overall, a total of 248 case studies were included for further analysis.

Results

A majority of hits from the REF database [n=220; 89 per cent] were tagged as a result of mentions of NIHR (and/or one of its support streams) in section 3 (references to the research) of the impact case studies (Figure 3).

Figure 3: counts of mentions of NIHR support, by REF impact case study section



To structure our analysis, we divided our findings into three principal streams:

- The nature of NIHR support – detailing the types of NIHR support stream, the period of NIHR’s support, and its role in contributing to impacts;
- The scale of NIHR support – detailing the health categories and diseases forming the focus of NIHR supported research, and the involvement of other funding agencies;
- The impact of NIHR support – detailing the types of societal gain noted in the case studies, the progression of NIHR supported research along a pathway to impact (including delivery of patient benefits and financial returns), and assessments and selected examples of case study narratives.

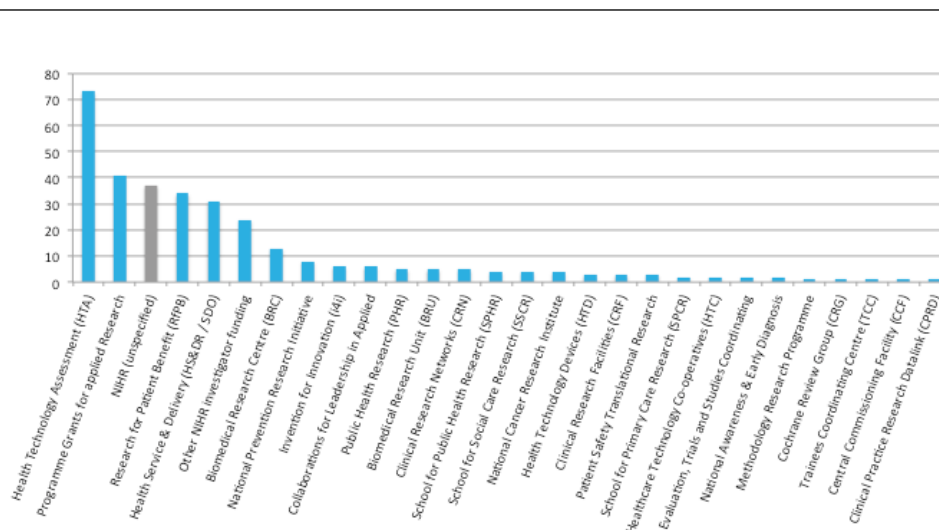
The nature of NIHR support

Case studies referenced 27 distinct NIHR support streams, from a total of 57 that we identified in our searches of the NIHR website and on checking with NIHR senior management staff.

Most frequently referred to was the Health Technology Assessment (HTA) stream [n=73; 29 per cent], concerned with evaluating the cost-effectiveness of new therapies prior to their adoption into the UK’s National Health Service. Excluding instances where NIHR support was referred to non-specifically

[n=37; 15 per cent], the next two most frequently referenced funding streams were those supporting highly clinically-focussed research, namely the NIHR's Programme Grants for Applied Research [n=41; 17 per cent] and Research for Patient Benefit [n=34; 14 per cent] schemes (Figure 4).

Figure 4: counts of references to NIHR support in case studies, by NIHR support stream



Most case studies [n=191; 77 per cent] noted NIHR as having supported research within the last 10 years, with just under a quarter [n=60; 24 per cent] exclusively noting NIHR support more recently than 2010. A number of case studies [n=21; 8 per cent] – mostly HTA-funded – referred to the UK Department of Health allocating research support prior to the NIHR's establishment in 2006.

In almost all cases, NIHR's primary involvement was as a contributor to the impacts described in the case studies [n=204; 82 per cent] or as a supporter of ongoing research [n=31; 13 per cent].

Fewer than 5 per cent of case studies either described impacts on NIHR (eg development of methods used for National Institute for Health and Care Excellence technology appraisals, later used as part of an NIHR programme grant) or were written so opaquely as to preclude any clear understanding of the nature of NIHR's role.

The scale of NIHR support

Case studies referencing NIHR support spanned all 21 HRCS health categories. By far the most frequently coded HRCS category was research of generic health relevance [n=77; 31 per cent] (Figure 5). Collating the list of primary disease tags noted against each case study and visualising these using a word cloud generator provides an indication of the breadth of diseases forming the focus of NIHR-supported research (Figure 6). Nevertheless, 'general health' and 'public health' were the most frequently tagged.

NIHR support was associated with a high degree of cooperative funding between different public and charitable research funding agencies.

Category	Percentage (%)
Generic Health Relevance	78
Mental Health	30
Cancer	22
Neurological	15
Cardiovascular	13
Stroke	13
Infection	11
Oral and Gastrointestinal	10
Metabolic and Endocrine	9
Congenital Disorders	8
Inflammatory and Immune System	7
Blood	7
Musculoskeletal	7
Eye	4
Reproductive Health and	4
Respiratory	4
Skin	3
Injuries and Accidents	3
Renal and Urogenital	2
Ear	2
Other	1

[illegible]

The impact of NIHR support

We found that the vast majority of NIHR supported case studies described ways in which research had contributed to societal benefits.

Almost all case studies [n=227; 92 per cent] provided evidence of research contributing to regional or national impacts (eg local or UK wide implementation of health practices based on research findings).

Many provided evidence of research contributing to changes in international practice [n=112; 45 per cent], eg through widespread changes in healthcare procedures, service delivery or training. Around half [n=118; 48 per cent] referred to specific public engagement and/or dissemination activities put in place to translate findings into practice.

A small number of case studies [n=38; 15 per cent] noted a direct contribution of research to commercial ends, eg protection of IP and/or spin-out companies.

High proportions of case studies noted contributions to direct impacts on patients [n=101; 41 per cent] and a majority substantiated these claims by providing evidenced figures on the scale of public benefits, eg changes in patient outcomes observed as part of the research findings. Most commonly reported were impacts in the region of 1,000 to 1 million people [n=60; 24 per cent], with only a few noting impacts on over 1 million people [n=5; 2 per cent].

Few case studies provided substantiated evidence of any financial returns deriving from uptake of the research findings [n=27; 11 per cent].

Those that did tended to report financial returns of over £1 million [n=21; 8 per cent]. The evidence underpinning these figures was variable in nature, ranging from formal cost effectiveness or health economic studies, through to projections based on scaling up localised savings or financial returns in line with increased evidence of changes in healthcare practice.

A third of case studies [n=84; 34 per cent] made reference to specific beneficiary groups (ie over and above strictly disease based groupings of patients), principally children and the young [n=45; 18 per cent], elderly people [n=19; 8 per cent], ethnic minorities [n=15; 6 per cent] and low-income groups [n=11; 4 per cent].

Lastly, our subjective assessment of the narrative potential of the case studies indicated that only a minority [n=22; 9 per cent] were so weak as to consider excluding from future narrative development, with the rest considered either neutral or with strong potential to develop further. To provide a snapshot of these narratives, we have selected three which highlight some of the diversity of the REF case studies [see Box 1].⁹

⁹ It must be noted that though we took care to base these summaries strictly on evidence presented in the case studies, they have not been checked with the case study authors. Links to the case studies themselves are provided within the text.

Box 1: example narratives of NIHR impact

Intervention: trials of the benefits of singing groups to improve health outcomes in the elderly.

Impact: Research at the Centre for Arts and Health at Canterbury Christ Church University has supported singing groups to improve health and wellbeing in elderly people. Since establishing a charity in 2005 to transfer research findings into practice, these groups now reach over 1,000 people per month. An NIHR-funded randomised controlled trial of singing for 300 people aged 60 or over showed evidence of improvements in mental wellbeing.

The team have since established local singing for mental health networks, and singing groups for Parkinson's and dementia. The Royal Society for Public Health incorporated research findings into national practitioner training in the arts, health and wellbeing. Lead researchers established an international arts and health journal, cited for its contributions to health care policy and public opinion.

NIHR support streams: Research for Patient Benefit

Scale: 1,000 to 1 million people

Financial return: n/a

Beneficiaries: elderly people

Intervention: feasibility of a newborn bloodspot screening programme, and a cluster trial to evaluate delivery of care, for patients with sickle cell disease.

Impact: A follow up to earlier HTA-funded research at King's College London (KCL) led to the establishment of a national newborn bloodspot screening programme for sickle cell disease and thalassaemia at KCL. Since 2008, this has led to the implementation of new UK-wide standards, care pathways, education and training, data collection and monitoring and evaluation of patients with blood disorders.

The programme has resulted in a majority of antenatal screening tests (61 per cent) for sickle cell anaemia and thalassaemia now being performed before the 1st trimester. The research has been recognised both nationally, and internationally (highlighted as a model for screening in other countries). It has contributed to efforts to improve pain management and the long-term care of patients with sickle cell disease, and fed into guidance for commissioners.

NIHR support streams: Health Technology Assessment

Scale: over 1 million people

Financial return: n/a

Beneficiaries: n/a

Intervention: establishing a stroke register of over 5,000 patients in South London to inform long-term care and policy, and trials of more effective care models (eg early supported discharge).

Impact: Registry data using risk of stroke (in particular ethnic variations in risk) and long-term outcomes informed the National Stroke Strategy, and enabled modelling of cost-effective options for stroke care. This fed into reconfiguration of stroke services in London, resulting in an estimated 12 per cent reduction in deaths at 90 days, a reduction in median length of hospital stay, and cost savings of £5.2m (£811 per patient).

Recommendations on early supported discharge informed national guidelines, and have been implemented in 66 per cent of English hospitals, with indications of reduced mortality in hospitals with better organised care.

NIHR support streams: Research for Patient Benefit, Programme Grants for Applied Research

Scale: 1,000 to 1 million people

Financial return: over £1 million

Beneficiaries: ethnic minorities

Discussion

Many approaches exist to undertake research impact assessments *de novo*, and their limitations have been widely discussed (Milat et al. 2015) (Morton 2015) (Wykes et al. 2013). Our approach made use of data arising from a pre-existing research impact assessment exercise, the UK's recent Research Excellence Framework (REF) and, specifically, a unique evidence-informed collection of narratives – impact case studies – describing the contribution of research to wider societal gains.

We set out to draw on the evidence available within the REF impact case studies, to highlight features of how research supported by one of the UK's largest public medical research funding organisations, the National Institute of Health Research (NIHR), is benefitting society. In curating an annotated database of these case studies we provide a birds-eye view of how NIHR's investment in research sustains a swathe of health, social and economic impacts.

In using the REF impact case studies as material for further analysis one must be mindful of the purpose for which they were written – namely the REF assessment process, written in response to specific REF guidelines. While they cannot be taken as a representative sample, it is clear the impact case studies represent a rich and unique resource able to tell a story of the progress of research over the past two decades. Our approach sought to ensure that factual statements on the size, scale and scope of impacts described in the case studies were justified by the underpinning research, before annotating these according to our coding framework.

It is likely that our analysis underestimates impacts attributable to NIHR's support. Case study authors were not obliged to reference their funding sources, and citation of funding information was highly variable across the full cohort of REF case studies (King's College London and Digital Science 2015).

This said, we have a degree of confidence that our analysis broadly describes a number of trends representative of NIHR's support of research. Our finding that the Health Technology Assessment (HTA) funding stream was the most frequently-referred to of the NIHR support streams is in line with HTA being the largest of the NIHR's dedicated research funding streams (Guthrie, Bienkowska-Gibbs, et al. 2015). We have no reason to suspect that NIHR would be more or less cited in the case studies than any other medical research funding organisation, however this cannot be ruled out.

One benefit of our approach – namely coding and quantifying features of case studies submitted to the REF – is in its use of publicly available data to generate an evidence based resource that can be quickly referred to for advocacy purposes. In the case of our previous work for UKCDS, our analysis fed into a web-based portal highlighting examples of high-impact research

in international development.¹⁰ In the case of NIHR, we have been able to generate a series of quantitative indicators that indicate the progression of a cohort of REF-submitted research studies towards societal gains. In addition, we have been able to signpost NIHR towards specific examples of achievements of research according to disease type, NIHR support stream, beneficiary groups and (in limited cases) financial returns.

A number of specific aspects of our analysis, such as evidence of a high degree of cooperation between public funding bodies, and the generic health relevance of much of the research supported by NIHR, provide reassurance that it is acting in line with its broad mandate to support 'the health and wealth of the nation'. The relatively large number of NIHR supported case studies we identified with strong potential for further narrative development provides additional reassurance of the value of this database for specific advocacy purposes.

Appreciably, and as a result of the extreme variability in how these data were presented in the case studies, we were not able to extract a great deal of financial information. We would direct those with an interest in this area to a recent analysis of the economic returns from 10 HTA studies (Guthrie, Hafner, et al. 2015). It estimated that if only 12 per cent of the net benefit of implementing the HTA's findings were realised over the course of a year, it would cover the entire cost of the HTA programme since its establishment (approximately £367 million). The REF data did not enable us able to compare returns from different support streams within NIHR (nor compare returns from NIHR versus other funders). Nonetheless, we were interested to note that of the 21 case studies providing evidence of financial returns upwards of £1 million, one-third of these (n=7) involved support from the HTA.

We should highlight that the REF impact case studies were only one of a number of data sources considered by HEFCE in this most recent UK wide research impact assessment exercise. Others have raised question marks as to how REF assesses research quality through its use of publication data, both in terms of variability in the reporting of bias in journal articles (Macleod et al. 2015), and discrepancies between bibliometric indices and peer review panel judgements across subsequent five-yearly iterations of the exercise (Wooding et al. 2015).

We would encourage others to build on and further develop techniques to probe the REF impact case studies. A recent study combined manual content analysis with a more in-depth interpretative analysis of a sub-section of 162 case studies in the field of public health and health services (Greenhalgh and Fahy 2015). In line with our findings, this study considered the format of the case studies as conducive to making judgements about the nature and quality of the research. The analysis also probed further, examining the quality of productive interactions between various stakeholders mentioned in the case studies, and exploring issues such as the acknowledgment of power differentials and conflicts of interest.

We are not aware of any ongoing efforts to examine those REF impact case studies relating to agriculture research, though these case studies do exist. As part of the topic modelling process undertaken for our previous synthetic analysis (King's College London and Digital Science 2015), we identified

¹⁰ See <http://www.ukcds.org.uk/the-global-impact-of-uk-research> for examples of UKCDS generating public-facing narratives that draw on our prior analysis of REF impact case studies [Accessed: 14 October 2015].

two topics of potential relevance to this field. The first, relating to food and nutrition research, had a total of 167 case studies assigned to it. The second, relating to research into animal husbandry and welfare, had 96 case studies assigned to it (though as a result of the topic modelling process there is likely to be a degree of overlap between case studies assigned to these topics). A more detailed analysis of these case studies could improve understanding of the impact of (UK) agricultural research along the lines presented here for health.

To conclude, we have found the REF impact case studies to be a rich and diverse source for further enquiry. Through our high-level and ‘deep dive’ analyses, we have revealed insights into UK research as a whole, as well as the contribution of specific research and funding initiatives to wider impacts. We hope that this paper is useful to the audiences attending the 2015 Impacts of Agricultural Research conference, and stimulates wider discussions around case study based approaches to impact assessment, and their complementarity with quantitative approaches.

Bibliography

Grant, J., Brutscher, P., Kirk, S.E., Butler, L. and Wooding, S., *Capturing Research Impacts: A review of international practice*, 2010, http://www.rand.org/content/dam/rand/pubs/documented_briefings/2010/RAND_DB578.pdf.

Greenhalgh, T. and Fahy, N., 'Research impact in the community-based health sciences: an analysis of 162 case studies from the 2014 UK Research Excellence Framework', *BMC Med*, 2015, 13(1), p. 232.

Guthrie, S., Bienkowska-Gibbs, T., Manville, C., Pollitt, A., Kirtley, A. and Wooding, S., 'The impact of the National Institute for Health Research Health Technology Assessment programme, 2003-13: a multimethod evaluation', *Health Technol Assess*, 2015, 19(67), pp. 1-292.

Guthrie, S., Hafner, M., Bienkowska-Gibbs, T. and Wooding, S., *Returns on research funded under the NIHR Health Technology Assessment (HTA) Programme*, 2015, http://www.rand.org/content/dam/rand/pubs/research_reports/RR600/RR666/RAND_RR666.pdf.

HEFCE, *Assessment framework and guidance on submissions (REF 02.2011)*, 2012, http://www.ref.ac.uk/media/ref/content/pub/assessmentframeworkandguidanceonsubmissions/GOS_per_cent20including_per_cent20addendum.pdf.

Hinrichs, S. and Grant, J., 'A new resource for identifying and assessing the impacts of research', *BMC Med*, 2015, 13, p. 148.

Hinrichs, S., Kamenetzky, A., Borjes, L. and Grant, J., *The non-academic impact of international development research in UK Higher Education: analysis using the REF 2014 impact case studies*, 2015, <http://www.kcl.ac.uk/sspp/policy-institute/publications/non-academic-impact-of-international-development-research.pdf>.

King's College London and Digital Science, *The nature, scale and beneficiaries of research impact: An initial analysis of Research Excellence Framework (REF) 2014 impact case studies*, 2015, <http://www.kcl.ac.uk/sspp/policy-institute/publications/Analysis-of-REF-impact.pdf>.

Macleod, M.R., Lawson McLean, A., Kyriakopoulou, A., Serghiou, S., de Wilde, A., Sherratt, N., Hirst, T., Hemblade, R., Bahor, Z., Nunes-Fonseca, C., Potluru, A., Thomson, A., Baginskitae, J., Egan, K., Vesterinen, H., Currie, G.L., Churilov, L., Howells, D.W. and Sena, E.S., 'Risk of Bias in Reports of In Vivo Research: A Focus for Improvement', *PLoS Biol*, 2015, 13(10), p. e1002273.

Manville, C., Morgan Jones, M., Frearson, M., Castle-Clarke, S., Henham, M., Gunashekar, S. and Grant, J., *Preparing impact submissions for REF 2014: An evaluation: Findings and observations*, 2015, http://www.rand.org/pubs/research_reports/RR727.html.

Milat, A.J., Bauman, A.E. and Redman, S., 'A narrative review of research impact assessment models and methods', *Health Res Policy Syst*, 2015, 13, p. 18.

Morton, S., 'Progressing research impact assessment: A "contributions" approach', *Res Eval*, 2015, p. rvv016.

Wilsdon, J., Allen, L., Belfiore, E., Campbell, P., Curry, S., Hill, S., Jones, R., Kain, R., Kerridge, S., Wouters, P., Hill, J. and Johnson, B., *The Metric Tide: Report of the Independent Review of the Role of Metrics in Research Assessment and Management*, 2015, http://www.hefce.ac.uk/media/HEFCE,2014/Content/Pubs/Independentresearch/2015/The,Metric,Tide/2015_metric_tide.pdf.

Wooding, S., Van Leeuwen, T.N., Parks, S., Kapur, S. and Grant, J., 'UK Doubles Its "World-Leading" Research in Life Sciences and Medicine in Six Years: Testing the Claim?' *PLoS ONE*, 2015, 10(7), p. e0132990.

Annexes

Annex 1: National Institute for Health Research support stream search keywords

(NB. including a number of historical NIHR support streams)

Red indicates no unique hits when using these search terms to query the REF case study database.

National Institute for Health Research (NIHR) OR National Institute of Health Research

Research Programmes

Efficacy and Mechanism Evaluation (EME)

Health Service and Delivery (HS&DR) OR Service Delivery and Organisation (SDO)

Health Technology Assessment (HTA)

Health Technology Devices (HTD)

Methodology Research Programme

Invention for Innovation (i4i)

Programme Grants for applied Research (PGfAR)

Programme Development Grants (PDG)

Public Health Research (PHR)

Research for Patient Benefit (RfPB)

Systematic Reviews Programme (SRP)

Centre for Reviews and Dissemination (CRD)

Cochrane Review Group (CRG)

Technology Assessment Reviews (TAR)

Other Programme Work

Blood and Transplant Research Unit (BTRU)

Centre for Surgical Reconstruction and Microbiology (CSRM)

Clinical Trials Units (CTU)

Health Protection Research Units (HPRU)

Horizon Scanning Centre (HSC)

INVOLVE¹¹

James Lind Alliance Priority Setting Partnership (PSP)

Research Design Service (RDS)

Cochrane Centre (UKCC)

Research schools

School for Primary Care Research (SPCR)

School for Public Health Research (SPHR)

School for Social Care Research (SSCR)

Clinical research units

Office for Clinical Research Infrastructure (NOCRI)

Translational Research Partnership (TRP)

Biomedical Research Centre (BRC)

Biomedical Research Unit (BRU)

Clinical Research Facilities (CRF)

Experimental Cancer Medicine Centre (ECMC)

Translational Research Collaboration (TRC)

Patient Safety Translational Research Centres (PSTRC)

Healthcare Technology Co-operatives (HTC)

Diagnostic Evidence Co-operatives (DEC)

Collaborations for Leadership in Applied Health Research and Care (CLAHRC)

MRC/NIHR Phenome Centre¹²

¹¹ As likely to generate a large number of false positives (ie unrelated to NIHR funding) this has been left out for the time being – nevertheless have noted where PPI and other linked activities are mentioned, in case useful future analyses may be performed

¹² Removed from search string as “/” character returns error: no hits using “phenome”

Coordinating centres

Evaluation, Trials and Studies Coordinating Centre (NETSCC)

Trainees Coordinating Centre (TCC)

Central Commissioning Facility (CCF)

Clinical Research Network Coordinating Centre (CRN CC)

Supporting NIHR Infrastructure

BioResource Centre

BioSample Centre

Join Dementia Research (JDR)

Health Informatics Collaborative (HIC)

NIHR investment into data and informatics

Clinical Practice Research Datalink (CPRD)

Clinical Records Interactive Search (CRIS)

Dementia Clinical Records Interactive Search (D-CRIS)

Other schemes where NIHR contributes funding

Flexibility and Sustainability Funding (FSF)

Clinical and Translational Radiotherapy Research Working Group (CTRad)

Supportive and Palliative Care Collaboratives (SuPaC)

National Prevention Research Initiative (NPRI)

National Awareness & Early Diagnosis Initiative (NAEDI)

Dermatology Clinical Trials Network (DCTN)

Health Challenge Innovation Fund

Annex 2: Coding framework for NIHR REF impact case study analysis

* Indicates category choices were not mutually exclusive ie one case study could have multiple values assigned to it

Category	Description	Values
REF case study #	Reference number (as per REF database)	[4-5 digit numeric]
* Tagged from which section?	Indicates if case study derives from hits on NIHR support stream terms in sections 3 or 4	- References to the research (section 3) - Details of the impact (section 4)
* How was NIHR's support referenced?	Lists which of the NIHR support streams was noted in the case study	[see Annex 1 for complete list]
What period was NIHR (/NHS R&D) support noted as falling within?	Indicates nearest 5-year period into which NIHR/NHS R&D support was provided	- pre-2006 - 2006-2010 - 2010 onwards
What was NIHR's primary involvement?	Indicates the nature of NIHR's support of the research and/or impact, or whether NIHR was itself a beneficiary from the research	- Contributed to impact - Currently supporting research - Impacts were on NIHR - Unclear / not specified
HRCS health code (primary)	The primary disease type into which the research was intended to have an impact	[one of 21 disease categories as per HRCS coding]
What was the primary disease focus?	The principle disease (if noted) forming the focus of the research	[short text]
What was the intervention?	A one-sentence description of the principle intervention(s) and/or investigation forming the focus of the case study	[free text]
What was the impact?	A short (2 to 3) sentence description of the key impact(s) to aid future narrative development	[free text]
Strength of narrative?	A further subjective indication of quality of the narrative in the case study, again to aid future narrative development	- Strong narrative – consider developing further - Neither strong nor weak - Weak narrative – consider excluding
* Which of the following were specifically noted?	An indication of the stages along a pathway to impact described in each case study (NB. non-linear therefore can select many)	- PPE/PPI/media (public engagement / dissemination) - Evidence cited (informed policy / strategy) - Implemented locally (into regional / UK practice) - Implemented widely (into international practice) - Commercial use (IP / spin-outs) - Outcomes observed (on patients)
What was the scale (if any) of reported impacts?	An indication of how many patients were benefitting directly from the impacts derived from the research (if noted and evidenced by references in the case study)	- Less than 1,000 people = 🧑 - 1,000 to 1,000,000 people = 🧑 🧑 - Over 1,000,000 people = 🧑 🧑 🧑
What was the financial return (if any) from the impacts?	An indication of the level of financial return (eg direct costs savings or return on investment) derived from the research (if noted and evidenced by references in the case study)	- Less than £1,000 = £ - £1,000 to £1,000,000 = ££ - Over £1,000,000 = £££
* Which (if any) beneficiaries were noted?	An indication of whether research was were targeted and/or having an impact on particular groups of beneficiaries	- Children and the young - Elderly people - Ethnic minorities - Low-income groups
From when did any NIHR-related impacts take place?	An indication of the timescale over which NIHR's support was bringing about impact	[2008 to present, or else “yet to deliver impacts”]
* Which partners were noted as co-funders?	An indication of the degree of collaboration across different funding sectors contributing to any impacts linked to NIHR support	- RCUK / UK charity / Industry / EU / Other international

www.kcl.ac.uk/sspp/policy-institute
@policyatkins
